Claims

1. Axial magnetic bearing apparatus in which a rotary disc made of a magnetic material is fixedly attached to a rotating shaft, while a pair of electromagnetic stators in each of which a ring-like electromagnetic coil for generating magnetomotive force is inserted into a coil slot are fixed to casings respectively so as to be located on opposite sides of said rotary disc with suitable very small distances, and on the basis of an output signal of a displacement sensor for measuring axial displacement of said rotating shaft, magnetic attraction force is made to act between said rotary disc and each of said electromagnetic stators so as to bear said rotating shaft in a target position distant from said electromagnetic stators and in non-contact therewith, said axial magnetic bearing apparatus being characterized in that a deep groove or through holes for forming an air layer having large magneto-resistance are provided in a vicinity of an axial center of said rotary disc so as to extend from an outer circumferential portion of said rotary disc toward said rotating shaft.

2. Axial magnetic bearing apparatus according to Claim 1, characterized in that said deep groove is formed all over an outer circumference of said rotary disc, while an inner diameter of said deep groove is smaller than an inner diameter of each of inside magnetic pole teeth of said electromagnetic stators.

3. Axial magnetic bearing apparatus according to Claim 1, characterized in that each of said through holes has a slit shape extending from said outer circumferential portion of said rotary disc to an outer circumferential portion of said rotating shaft.

4. Axial magnetic bearing apparatus according to any one of Claims 1 through 3, characterized in that a distance between a surface of said rotary disc located in a position not opposed to any one of an inside magnetic pole tooth and an outside magnetic pole tooth of corresponding one of said electromagnetic stators and a surface of said corresponding electromagnetic stator opposed to said surface of said rotary disc is formed to be larger than a distance between a surface of said rotary disc located in a position opposed to each of said inside magnetic pole tooth and said outside magnetic pole tooth of said corresponding electromagnetic stator and a surface of said corresponding electromagnetic stator opposed to said surface of said rotary disc.

5. Axial magnetic bearing apparatus according to any one of Claims 1 through 4, characterized in that slits large enough to increase radial magneto-resistance are provided at several places in outer circumferential portions of said electromagnetic stators.

6. Axial magnetic bearing apparatus according to any one

of Claims 1 through 5, characterized in that an outer circumferential groove for forming an air layer having large magneto-resistance is provided in a portion of each of said outside magnetic pole teeth of said electromagnetic stators not opposed to said rotary disc so as to extend axially from a side where said rotary disc is located.

7. Axial magnetic bearing apparatus according to any one of Claims 1 through 6, characterized in that an outer diameter of each of said electromagnetic stators is formed to have substantially as large as an outer diameter of said rotary disc, and a ring made of a non-magnetic material having a radial thickness enough to form a layer with large magneto-resistance is interposed between an outer circumferential portion of each of said electromagnetic stators and an inner circumferential portion of corresponding one of said casings to which said electromagnetic stator is attached.

8. Axial magnetic bearing apparatus according to any one of Claims 1 through 7, characterized in that a collar made of a non-magnetic material for relatively positioning where said pair of electromagnetic stators are attached is provided between said pair of electromagnetic stators.